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ScienceDirect

Procedia Economics and Finance 14 (2014) 575 – 584

Procedia
Economics and Finance

www.elsevier.com/locate/procedia

International Conference on Applied Economics (ICOAE) 2014

The static and dynamic criteria of building an investment asset portfolio

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Abstract

Although there is a rather thick layer of empirical studies on how to build an investment portfolio, both in terms of hypotheses being tested and sets of methods being used, the efforts of researchers are focused on proving the power of indicators exclusively of static criterion of the companies' performance, i.e. the power of illustrating the market price. And while the history of such research activities extends back over decades, the main driver of the comprehensive development of practical recommendations formed on their basis is an increase in the quality of sampling and improvement in research methods. As for the issue of building an investment portfolio on the basis of such currently used cost indices as economic value added (EVA), the whole pool of research work has already been formed for today, characterizing the connection of the index with the company's value. The analysis performed allows us to share positive conclusions about its relevance to emerging markets in post-crisis period as well. But what is more significant, based on the results of empirical analysis, we substantiate the necessity for researchers to go beyond the scope of the problem of selecting this or that index of static efficiency and pay attention to the dynamic efficiency index that reflects how a company has fulfilled its potential to increase value through compliance with standard correlations of growth rates of static efficiency indices. The article also offers the projection of conclusions on empiric testing of defined hypotheses on the theory and practice of corporate governance and potential aspects of the future research.

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Keywords: Investment portfolio, shareholder value, economic value added, dynamic performance criterion, criterion value based management efficiency evaluation model, value based management, corporate governance.

1. Introduction

The range of portfolio building methods is quite big. The investment portfolio theory of W. Sharpe, H. Markovitz and J. Tobin is of the greatest influence. The level of knowledge in this field is characterized by

Selection and/or peer-review under responsibility of the Organizing Committee of ICOAE 2014
doi:10.1016/S2212-5671(14)00740-0

describing its fundamental aspects in the papers of such foreign academic economists as E. Elton, M. Gruber and M. Patberg. They suggested a calculation method for portfolio investment characteristics based on one-factor (market) model establishing statistic interrelation between return on each share and return on the stock market as a whole represented by return indicated by the share index [Sharpe, 2003].

Unlike a speculator, investor relies on indices, which reflect the fundamental characteristics of an investee in the longer term. For a saver, the key point in investment decision making is a value created not speculatively subject to the market trends but as a result of a fair increase in the market price. That is why a portfolio investor needs such a tool that would reflect a qualitative increase in the value and the fundamental quality of a portfolio.

Classical approaches have considerably lost their attractiveness. The index of surplus value and accounting profit is quite contradictory in terms of its application as an indicator of an increase in shareholder value. And the present value indicator that has been actively popularized is rather subjective and may change subject to macroeconomic factors. The residual income indicator known as economic value added* (EVA® - Economic Value Added) meets the required characteristics of an effective criterion of developing an investment strategy, taking into account that the strategy anticipates the property of stability for an at least the medium-term period (we define it as a three-year horizon). Leaving the theoretical arguments of choosing the economic value added index as the basic parameter of building an investment portfolio beyond the scope of the research, we suggest forming an initial portfolio based on classifying companies according to the positive and negative values of this index. But we need to understand that while the economic value added is an index of the modern concept of the company worth management, evaluations made on its basis reproduce a static evaluation criterion. Statics is a fixed state of space with relevant momentary time characteristics, and dynamics is the movement of this fixed state along the time line. A static criterion implies a certain state one should aim to. A dynamic criterion is much more complex by its nature [Byakov O., 2004]. It defines the development trend every moment reflecting the condition to be aimed to maximize the company value [6]. One of the properties distinguishing dynamic criterion from the static one is the form of its presentation as a dynamic vector characterizing a condition treated as a standard and ideal one. Parameter points, when using the dynamic criterion, are not fixed values in a general case: Each of them can change in a certain interval. The dynamic criterion does not set particular parameter points that should be reached to maximize the company's worth, but states a relation between parameters, which, if maintained, provides an increase in the worth. The dynamic criterion does not correlate a decision about the investment portfolio formation and any value or a group of values. It reflects the quality of the worth creation process at every moment of its realization against a certain ideal condition.

In terms of the dynamic criterion, an increase in shareholder value may only be observed if economic value added is ahead of, for example, asset value by the rate of their growth. Every moment, both EVA and the assets value are impacted by numerous factors. So, it is reasonable to look at their intervals (EVA and Assets), where the indicators have certain values, and at relations between their growth rates, but not at their specific value.

We believe, from the substantial point of view, the dynamic criterion of evaluating investment decisions extends the analytical value of the pre-investment analysis of expected return indicators.

2. Hypothesis and research methods

As an initial hypothesis we suggest using one subject to which EVA can serve as a relatively efficient criterion of building an investment portfolio and developing an efficient investment strategy for short-term, medium-term and long-term periods. We believe the results of the hypothesis testing would confirm the role of EVA as a criterion of building an initial investment portfolio.

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* Economic value added (EVA® - Economic Value Added) is a registered trademark of Stern Stewart & Company.

As a dependent indicator showing changes in the market value, we choose a market-to-book ratio or MBR (correlation of the market and book values). It is one of the company's performance indicators that correlates the book and market values of recourses. It is mainly used in building an investment portfolio. The indicator characterizes the surplus value of the share capital that is why it allows us to make a conclusion about an increase in the market value.

As part of the research, a statistic model was developed. The model was based on the identification of the significance of the difference between the averages of two subsamples (grouped based on ranking the sampled population by the EVA level) based on the Student's Independent Samples T-test.

For the sampling purposes, after the ranking, fifteen leading and fifteen lagging companies were selected according to their EVA. So, two subsamples were formed. The values of the independent EVA variable had two values, i.e. EVA>0 and EVA<0. Accordingly, the variable allowed splitting all analyzed data into two groups. In that case the groups were marked with the zero cut point. We had to identify the significance at the 5% level.

We selected MBR as an investment strategy performance indicator based on EVA. It characterized the surplus of company's stock value.

So, we had to identify the correlation between MBR and EVA. To test the availability of the statistic correlation between those indicators or its absence, we used a Student's T-test.

During the T-test, the initial hypothesis was expected to be either accepted or rejected. To complete the task, two objectives were met consequently:

- The equality of the variances for the tested variable was tested in two compared groups.
- The interrelations between the tested variables, i.e. the inequalities of the averages of the tested variables, were identified in two compared groups.

The above tasks were the objective of the first stage of our research. At the next stage, we demonstrated the necessity of extending the list of tools used in building an investment portfolio. It could be reached by shifting from the static criterion of performance to the dynamic one using the method of the first stage. The stage two key objective was to decide whether the dynamic criterion improved the performance of a portfolio, which had been initially formed on the basis of the static criterion.

3. Research sampling

As the authors are aimed at shaping an easy-to-use and understandable investment strategy, the research does not cover the values of any other factors other than MBR, which would characterize an increase in the company's worth, the firm's capitalization and growth in stock value. In this respect, no additional indices were used in the model to ensure the investment strategy would be easy-to-understand and easy-to-use when based on the proposed theory.

The research was deliberately based on the Russian companies' data and followed the results we had gained earlier on the search focused on tools of long-term management of company's market price. The population included data about companies operating in various sectors of economy and in various markets.

For the purposes of sampling used in the research, we used information from the SPARK (System of Professional Analysis of Markets and Companies) database administered by Interfax rating information agency and the resources of the SPARK rating agency. We reviewed 88 Russian companies covering the period of four years (2009-2012). The sampling amounted to 352 observations.

According to the above-described approaches to forming the population, a sampling of 30 companies was made that served as original materials for the Student's T-test. The results of the sampling procedures are provided in Table 1.

Table 1. Sampling results

Company	EVA, 2009	MBR, 2009	MBR, 2010	MBR, 2011	MBR, 2012
SURGUTNEFTEGAZ OJSC	80,881,620.4	0.87	0.84	0.67	0.61
Mining and metals company Norilsky nikel OJSC	62,564,167.3	2.09	2.31	2.57	1.52
MTS OR OJSC MOBILNIE TELESISTEMY OJSC	53,953,822.3	3.60	4.74	4.46	4.86
Tatneft named after V.D. Shashin OJSC	24,283,619.2	1.24	1.17	1.22	1.32
Brewing company Baltika OJSC	24,056,335.6	2.66	2.32	4.30	4.98
LUKOIL OJSC	13,191,674.3	4.14	4.31	3.45	2.54
Joint-Stock Petroleum Company Bashneft OJSC	12,965,884.2	0.82	2.21	2.66	2.81
NOVATEK OJSC	11,214,080.2	5.09	7.87	10.88	7.70
Farmstandart OJSC	3,830,314.2	7.57	10.16	5.64	2.74
Dorogobuzh OJSC	2,637,996.1	1.70	1.16	-1.27	0.68
Krasnoyarsk HPP OJSC	2,262,086.1	1.47	2.42	3.06	1.29
RASPADSKAYA OJSC	2,259,896.5	3.64	5.20	5.30	2.22
MGTS OJSC	2,091,904.5	0.79	0.49	0.52	0.53
Irkutsk corporation OJSC	1,507,871.3	0.63	0.64	0.50	0.34
Irkutskenergo OJSC	1,404,878.3	1.63	2.36	1.90	0.92
PIK Group of companies OJSC	-2,108,056.3	0.58	1.66	2.12	0.98
MOSENERGO OJSC	-2,352,003.7	0.66	0.74	0.52	0.26
KUZBASSENERGO OJSC	-2,565,864.9	0.43	1.07	0.70	0.34
MRSK Severo-Zapada OJSC	-2,671,358.3	0.35	0.69	0.38	0.24
KAZANORGSINTEZ OJSC	-2,858,473.1	0.49	1.56	1.26	0.96
Yakutskenergo OJSC	-3,483,179.5	0.15	0.28	0.21	0.14
INTER RAO OJSC	-4,933,438.6	0.84	1.44	3.64	0.80
OPIN OJSC	-5,739,792.5	0.27	0.19	0.18	0.14
GAZ OJSC	-6,219,061.9	0.35	0.58	1.45	1.09
KAMAZ OJSC	-6,945,302.8	0.55	1.18	0.81	0.65
DEK OJSC	-8,031,099.0	0.17	0.34	0.40	0.35
Severstal OJSC	-21,532,210.1	0.74	1.34	1.80	1.25
AVTOVAZ OJSC	-35,261,500.0	0.35	3.19	2.68	0.87
Joint Stock Financial Corporation SISTEMA OJSC	-76,453,014.1	0.36	0.76	0.56	0.60
Federal network company of United Energy System OJSC	-90,304,544.1	0.48	0.80	0.51	0.30

We conducted the research within the horizon of one, two and three years similarly to the horizons of short-term, medium-term and long-term strategies for building an investment portfolio.

All statistical calculations were performed with the use of Statistical Package for Social Sciences for Windows (SPSS 21.0).

Table 2 describes the major statistical characteristics of variables representing the parameters of the analyzed model.

Table 2. Description of variables

Variable	Description/Wording
EVA (Economic Value Added)	Economic Value Added
Dynamic performance index	Dynamic performance index shows to what extent a company has complied with standard rates of correlation between the dynamic criterion growth rates (capitalization growth rate > economic value added growth rate > revenue growth rate > assets growth rate > net assets growth rate). Dynamic performance index is a ratio of the number of coincidences of actual dynamic criterion growth rates to the standard ones and the maximum number of correlations.

MBR (market-to-book ratio)	The market price/book value multiplier is a ratio of the share's market price to its book value. The share's market price is its price at stock exchange driven by demand and supply. The share's book value is also a stock price denominated in rubles, calculated by dividing net assets value (NAV) by the number of issued ordinary shares.

4. Discussion of research results

Descriptive statistic data is provided in Table 3. The research covered fifteen companies with the highest EVA index and fifteen companies with lowest EVA index in total. We also had identified the average means of tested MBR for each subgroup. At the point of building an investment portfolio, and subject to further evaluations of the investment strategy within the horizon of one, two or three years, showed that the average means of multiplier characterizing the share price in the open market was higher in the Top-15 Leading Companies group than in Top-15 Lagging Companies group. Let us check if the difference is significant from the point of view of statistics. The answer was gained through a T-test.

Table 3. Descriptive statistics for 2009–2012

Group Statistics

	EVA, 2009	N	Mean	Std. Deviation	Std. Error Mean
MBR, 2009	>= 0	15	2,52908	1,95974	0,50600
	< 0	15	0,45112	0,19693	0,05085
MBR, 2010	>= 0	15	3,21386	2,79682	0,72214
	< 0	15	1,05566	0,75001	0,19365
MBR, 2011	>= 0	15	3.05737	2.91606	0.75292
	< 0	15	1.14886	1.01713	0.26262
MBR, 2012	>= 0	15	2.33575	2.07638	0.53612
	< 0	15	0.59782	0.37309	0.09633

The T-test results of the correlation between the grouping (independent variable - MBR) and tested variables (dependent variable – EVA) within one and the same accounting period, and the results of identifying their significance for the period of 1-3 years to test the hypothesis under review are provided in Table 4.

Table 4. The T-test results for independent samples

Independent Samples Test

Investment period			Levene's Test for Equality of Variances		T-test for Equality of Means						
			F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
										Lower	Upper
Zero period	**MBR, 2009**	Equal variances assumed	21,57274	0,00007	4,08603	28,00000	0,00033	2,07796	0,50855	1,03624	3,11968
		Equal variances not assumed			4,08603	14,28271	0,00107	2,07796	0,50855	0,98925	3,16667
In view of 1	**MBR, 2010**	Equal variances assumed	12,89047	0,00125	2,88664	28,00000	0,00742	2,15820	0,74765	0,62670	3,68969

year		Equal variances not assumed			2,88664	16,00320	0,01073	2,15820	0,74765	0,57327	3,74312
In view of 2 years	**MBR, 2011**	Equal variances assumed	5,93538	0,02146	2,39337	28,00000	0,02364	1,90850	0,79741	0,27508	3,54193
		Equal variances not assumed			2,39337	17,35688	0,02825	1,90850	0,79741	0,22874	3,58826
In view of 3 years	**MBR, 2012**	Equal variances assumed	12,69909	0,00134	3,19060	28,00000	0,00349	1,73793	0,54470	0,62216	2,85371
		Equal variances not assumed			3,19060	14,90308	0,00612	1,73793	0,54470	0,57626	2,89960

Table 4 shows the T-test results by each investment period subject to the equality in variances as follows:

а) equal variances assumed;

б) equal variances not assumed.

Depending on whether there was the equality of variances or not, when analyzing the T-test results, we interpreted the results of one of the two lines of each period. The equality of variances was tested through the Levene's test. The accuracy of the hypothesis on the equality of variances was identified against the Significance value. In our case, it was less than 0.002 in the zero period, within the horizon of one and three years of investments and little more than 0.021 within two years. It meant that the initial hypothesis could decline with the error probability of 0.2% and 2.1% respectively, which was less than the applicable value (5%). So, the initial hypothesis could be rejected.

The Levene's test results demonstrated that the allocation of tested variable in compared groups had different variances. When selecting one of the two versions of the T-test results for each period defined in Table 4, we chose the second line “Equal variances not assumed”.

The T-test tested the possibility of the general hypothesis, i.e. "The averages of two groups are equal". The probability of the hypothesis was tested against the Significance (2-tailed) value. In our case the index did not exceed 0.02 in 2009, 2010 and 2012 but made 0.028 in 2011. It meant that the initial hypothesis could be accepted at the level of significance of 5%. Table 5 provides the T-test results for independent samples broken down for three years.

Table 5. Summary of results

"Significance (2-tailed)"			
1	2	3	4
2009	2010	2011	2012
0.00107	0.01073	0.02825	0.00612
The correlation between tested indicators is identified.			

So, based on the tests we had developed, we could come to the conclusion about the significance of the correlation between economic value added and the market price of the company within all the horizons of the investment portfolio formation process.

Economic value added (EVA) can serve as a rather efficient tool of building an investment portfolio and developing an efficient investment strategy under the emerging market conditions with the period of 1-3 years.

Most of research activities focused on building an investment portfolio and selecting an indicator with the best forecasting power would end up exactly at this stage. We strongly disagree with such an approach and believe that it is possible to improve the quality of the investment portfolio formed at the first stage using the dynamic performance criterion.

Based on the fact of compliance/noncompliance with standard correlations between growth rates of the companies' internal indicators, the Dynamic Index values of originally reviewed thirty companies were calculated for the year of 2009.

As the calculation structure of the dynamic performance indicator is derived from statistic characteristics included into the algorithm of its calculation, the authors of the research have made a secondary sampling based on the dynamic criterion and grouped following the above method. By separating five companies with the lowest Dynamic Index value in the group of leaders by the static indicator (Subgroup 1) and five companies with the highest Dynamic Index value in the group of the most lagging companies by the statistic indicator (Subgroup 0) a secondary sampling was made out of 20 companies. The sampling is described in Table 6. Dual marking was made to divide the companies into subgroups for potential investments in a more contrasting manner and to simplify the process of statistic analysis.

Table 6. The secondary sampling results

Company	Subgroup according to Dynamic Index, 2009	MBR, 2009	MBR, 2010	MBR, 2011	MBR, 2012
SURGUTNEFTEGAZ OJSC	1	0.87	0.84	0.67	0.61
Joint-Stock Petroleum Company Bashneft OJSC	1	0.82	2.21	2.66	2.81
MTS OR OJSC MOBILNIE TELESISTEMY OJSC	1	3.60	4.74	4.46	4.86
NOVATEK OJSC	1	5.09	7.87	10.88	7.70
Farmstandart OJSC	1	7.57	10.16	5.64	2.74
Irkutsk corporation OJSC	1	0.63	0.64	0.50	0.34
Tatneft named after V.D. Shashin OJSC	1	1.24	1.17	1.22	1.32
Krasnoyarsk HPP OJSC	1	1.47	2.42	3.06	1.29
Mining and smelting company Norilsky nikel OJSC	1	2.09	2.31	2.57	1.52
Brewing company Baltika OJSC	1	2.66	2.32	4.30	4.98
Yakutskenergo OJSC	0	0.15	0.28	0.21	0.14
INTER RAO OJSC	0	0.84	1.44	3.64	0.80
GAZ OJSC	0	0.35	0.58	1.45	1.09
DEK OJSC	0	0.17	0.34	0.40	0.35
Severstal OJSC	0	0.74	1.34	1.80	1.25
Mosenergo OJSC	0	0.66	0.74	0.52	0.26
KUZBASSENERGO OJSC	0	0.43	1.07	0.70	0.34
MRSK Severo-Zapada OJSC	0	0.35	0.69	0.38	0.24
OPIN OJSC	0	0.27	0.19	0.18	0.14

KAMAZ OJSC	0	0.55	1.18	0.81	0.65

The above indicators served as the basis for testing the significance of the optimization investment strategy targeted on a qualitative increase in the investment portfolio value. MBR served as an independent variable.

Following the above method, within each investment period, the mean of the market price/book value for the shares of Subgroup 1 were higher than the mean of Subgroup 0. The results are clearly presented as descriptive statistics in Table 7.

Table 7. Descriptive statistics of the second sampling for 2009-2012

Group Statistics

	Dynamic Index, 2009	N	Mean	Std. Deviation	Std. Error Mean
MBR, 2009	1	10	2.60282	2.24543	0.71007
	0	10	0.44953	0.23697	0.07494
MBR, 2010	1	10	3.46792	3.18612	1.00754
	0	10	0.78632	0.45132	0.14272
MBR, 2011	1	10	3.59670	3.06364	0.96881
	0	10	1.00997	1.06645	0.33724
MBR, 2012	1	10	2.81450	2.35708	0.74537
	0	10	0.52523	0.40165	0.12701

It was necessary to evaluate the significance of the difference of the means of the two subgroups from the statistical point of view. Statistical calculations were made on the 95% level of the confidence interval. The T-test results related to the correlation between the grouping variable (independent variable - MBR) and the tested variable (dependent variable - Dynamic Index) had identified the correlation between the indicators under research within all the tested horizons of planning with the probability of error of less than 3% (in 2009 – 1.4%, in 2010 – 2.6%, in 2011 – 2.8%, in 2012 – 1.3%), which was lower than the acceptable level of 5%.

If the mean values of a market multiplier in subsamples based on the economic value added index are compared with that of the subgroups based on the dynamic index, the optimization investment strategy would be characterized by the higher average growth of the portfolio market price. The empiric research performed allows indicating economic efficiency. The comparative characteristics described in Table 8 indicate the lightly higher probability of error of the optimization strategy based on the dynamic criterion if compared to that formed by a static criterion. We believe, the circumstances are a logical display of the correlation between the expected return and the risk accepted by the investor. In addition, probabilistic risk assessment value in the case of the dynamic criterion stays within the acceptable limit 5%.

Table 8. Comparative characteristics of the performance of investment portfolios formed based on the static and dynamic criteria.

Resultant index	Mean (EVA)	Mean (Dynamic Index)	Sig. (EVA)	Sig. (Dynamic Index)
MBR, 2009	2.52908	2.60282	0.00107	0.01423
MBR, 2010	3.21386	3.46792	0.01073	0.02627
MBR, 2011	3.05737	3.59670	0.02825	0.02814
MBR, 2012	2.33575	2.81450	0.00612	0.01343

5. Conclusions

The results of the first part of our analysis generally confirm the illustrative power of the economic value added index in emerging economies which was identified as a result of previous researches [A. Ankudinov, A. Gizatullin, A. Shishkin, 2006]. The data acquired indicate the availability of the economic value added significance in post-crisis periods as well. It is necessary to realize that economic value added, which has retained its quantitative significance of its impact on creating the shareholder value even in the post-crisis period, remains a static index of the company's performance only. The results of the second part of the empiric research allowed concluding the following: Limiting the selection of the illustrating index by the static performance criterion only the investor limits the opportunities of the portfolio's further optimization and excludes the acceptance of additional risk premium on excepted returns reflecting potential growth of shareholder value.

6. An outlook for further research

Research results confirm indicated in previous papers [5,6] the necessity of the transition from static to complex criterion models to evaluate the efficiency of value based management and corporate governance.

The above conclusion allowed defining promising research areas as well as major aspects that would allow improving the research quality.

1. The development of complex criterion model to evaluate the efficiency of value based management and corporate government by adding more criteria in the competitiveness and risk issue.
2. The industry specifics of the criterion models to study the connection between the model index and market price.
3. The improvement of the historical representativeness of sampling.

The researchers see the significant potential of improving the quality of research and findings by including longer period data into sampling.

4. The improvement of the national representativeness of research sampling with a differentiation according to the country of tax residence of the company.

The researchers see the significant potential of improving the quality of research and findings by initial modeling the structure and content of the companies' population.

5. Ensuring comparability of the analyzed accounting indicators by national economies.

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